OPERATIONAL AND CALIBRATION INSTRUCTIONS

SERIES MX-1

DIGITAL VOLTMETER

NON-LINEAR SYSTEMS, INC.
DEL MAR, CALIFORNIA

Document No. 1499
September 1972

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CAUTION

1. When measuring DC voltage or DC/DC voltage ratio, DO NOT apply more than 300 volts when in the Automatic Range (AUTO RNG) mode of operation.

2. When measuring DC voltage or DC/DC voltage ratio, DO NOT apply more than 800 volts when in the Manual Range (RNG CHNG) mode of operation.

3. Disregard any reference in this manual to any voltage higher than those expressed above in the two stated functions.

4. Failure to observe these precautions will cause damage to the instrument.

Retrofit or replacement of the instrument will be effected to ensure that the MX-1 will meet the voltage specifications set forth in paragraphs 1-4 and 1-5 of this manual.

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CHAPTER I

INTRODUCTION AND SPECIFICATIONS

1-1. GENERAL

The Series MX-1 Digital Voltmeter is a solid-state digital measuring instrument with five full digits and a sixth digit which provides a 20 percent over-range capability, except in the 1,000-volt range for DC and AC volts measurement. Polarity of signal input is displayed automatically and range changing may be either automatic, or manually controlled as selected by front-panel switches.

The instrument measures DC voltages in 5 ranges from .000001 volt to ±1000.00 volts. The instrument measures +DC/+DC voltage ratio X 10 (with +1 volt to +10.5 volts reference input) in 5 ranges from +.000001 to +1000.00; and, with an optional AC/DC converter accessory, AC voltages in four ranges from 0.00001 volt to 1000.00 volts. Also with the optional AC/DC converter the instrument measures AC/DC voltage ratio X 10 in 4 ranges from 0.00001 to 1000.00. With an optional KΩ/DC converter accessory, the instrument measures resistance in 6 ranges from .000001KΩ to 11999.9KΩ. Isolated data output, input cables and rack-mounting adapters are also offered as optional accessories.

1-2. DESCRIPTION

The voltmeter is portable, weighing less than 15 pounds. A carrying handle is provided which also serves as a tilt-stand for the unit. By removal of the top and bottom covers of the instrument, internal calibration and adjustment controls are easily reached and clearly labeled. Power application and function and range selection are accomplished by activation of pushbutton switches on the front panel. Signal input binding posts, located on the front and rear of the instrument, will accept standard test leads or leads equipped with banana plugs. The powerline cord is permanently attached to the rear of the unit and terminates in a three pin polarized plug. The powerline fuse is externally located in an extractor post on the rear of the instrument.

In operation, the unknown input voltage applied to the instrument is buffered and used to charge a capacitor during a specific time internal. An internal reference is then applied to discharge the capacitor. Measuring the time interval required to discharge the capacitor indicates the unknown input which is visually displayed in neon glow tubes at the front of the instrument.

1-3. SPECIFICATIONS - GENERAL

Estimated MTBF: 10,000 hours

Display: In-line neon tube display of numerals

Maximum Inputs:

"HI" to "LO": See individual function specifications.

"LO" to Guard: ±100 volts

Guard to Ground: ±1000 VDC or peak AC

Operating Temperature Range: 0°C to +50°C

Non-Operating Temperature Range: -40°C to +75°C

Operating Humidity Range:

0°C to 25°C - 80% relative humidity, max.

25°C to 50°C - 70% relative humidity, max.

Operating Altitude: 10,000 feet, max.

Non-Operating Altutide: 50,000 feet, max.

Shock & Vibration: Meets requirements of MIL-T-21200 and MIL-E-16400.

Power: 105-125/210-250V, 50 to 440 Hz, less than 20 watts with all options

Warm-Up Time: 30 minutes to meet all specifications

Weight:

Basic Instrument: Less than 15 lbs.

Basic Instrument Plus All Options: Less than 19 lbs.

Over-all Dimensions: 8-1/2"W x 3-1/2"H x 15"D

1-4. SPECIFICATIONS - DC VOLTS

Ranges	Resolution	Input Resistance
±.100000 volts	1 μV	100 megohms, min.
±1.00000 volts	10 μV	1000 meghoms, min.
±10.0000 volts	100 μV	10,000 megohms, min.
±100.000 volts	1 mV	10 megohms
±1000.00 volts	10 mV	10 megohms

Over-range: 20% (1000V. maximum)

Input Overload Voltage: 1000 VDC or RMS (1500V peak AC) overload with no damage (any range)

Range Selection: Automatic and Manual

Polarity Selection: Automatic

Accuracy: (4 higher ranges)

24 hours, 23°C ±1°C
±(0.005% of input + 0.002% of range)

30 days, 20°C to 30°C
±(0.008% of input + 0.002% of range)

90 days, 20°C to 30°C
±(0.01% of input + 0.002% of range)

6 months, 20°C to 30°C
±(0.01% of input + 0.004% of range)

1 year, 20°C to 30°C
±(0.015% of input + 0.005% of range)

Accuracy: (0.1-Volt Range)

24 hours, 23°C ±1°C
±(0.005% of input + 0.004% of range)

90 days and 6 months, 20°C to 30°C
±(0.01% of input + 0.01% of range)

1 year, 20°C to 30°C
±(0.015% of input + 0.01% of range)

Temperature Coefficient: (4 higher ranges)

0°C to 20°C, 30°C to 50°C
±(0.0005% of input + 0.0005% of range)/°C

Temperature Coefficient: (0.1-Volt Range)

0°C to 20°C, 30°C to 50°C
±(0.0007% of input + 0.001% of range)/°C

Filtering: Two-pole active filter followed by integration in the A/D conversion

Normal-Mode Rejection:

3 Higher Ranges

Greater than 60 db at 50 Hz

2 Lower Ranges

Greater than 55 db at 50 Hz
Greater than 60 db at 60 Hz and above

Common-Mode Rejection in 1000 Ohms unbalance in either lead:

3 Higher Ranges

Greater than 140 db at DC
Greater than 140 db at 60 Hz and above

2 Lower Ranges

Greater than 140 db, DC to 60 Hz

Maximum Common-Mode Voltage: 1000 VDC or peak AC

Response Time to within 0.01% of step function change, including polarity change:

4 Higher Ranges

1 second, max.*

0.1-Volt Range*

3 seconds, max.

*Response time figures applicable for source resistances up to 50 kilohms.

1-5. SPECIFICATIONS - +DC/+DC VOLTS RATIO X 10

Ratios Obtainable: +DCV/+DCV (standard) or ACV/DCV (with Option A or B)

Ranges: Same as DC volts (or AC volts) except that reading displayed is the ratio X 10.

Over-Range: 20%

Range Selection: Automatic and manual

Polarity Selection: Automatic

Accuracy: Same as DC volts (or AC volts) except "% of range" is multiplied by 10V/E ref.

Reference Voltage: +1 volt to +10.5 volts DC

Reference Input Resistance: Greater than 1000 megohms

Response Time of Reference to within 0.01% of step function change:

Less than 1 second

Reference Normal-Mode Rejection: Greater than 60 db at 60 Hz

Isolation: Reference common can be positive with respect to input common by 1 volt, maximum. Reference common can be negative with respect to input common by 10 volts, maximum.

1-6. SPECIFICATIONS - AC VOLTS

Ranges	Resolution
1.00000 volt	10 microvolts
10.0000 volts	100 microvolts
100.000 volts	1 millivolt
1000.00 volts	10 millivolts

Over-range: 20%

Maximum Input Voltage: 1000V RMS (1500 V Peak)

Maximum Volt-Hertz Product: 2×10^7

Range Selection: Automatic and Manual

Sensing and Calibration: True-average sensing, calibrated in RMS of sinewave

Accuracy, 20°C to 30°C:

50 Hz to 10KHz

±(0.1% of input + 0.05% of range)*
+ 0.06% of range) 30 days
+ 0.065% of range) 90 days
+0.07% of range) 6 months

*"±0.05% of range" accuracy can be obtained at any time during a six month period via front panel AC zero. ±0.05% is typically maintained for 24 hours following zero adjustment. 30-day, 90-day, and 6-month intervals start after the last use of the AC zero.

30 Hz to 50 Hz and 10 KHz to 20 KHz

±(0.5% of input + 0.1% of range)*
+ 0.105% of range) - 30 days
+ 0.11% of range) - 90 days
+ 0.115% of range) - 6 months

*See footnote, preceding page.

Temperature Coefficient:

0°C to 20°C, 30°C to 50°C:

±(0.006% of input + 0.003% of range)/°C

Response Time to within 0.1% of step function Change: Less than 1 second

Common-Mode Rejection, DC to 60 Hz: Greater than 120 db with 100 ohms unbalance in either lead

Maximum Common-Mode Voltage: 1000V DC or Peak AC

1.7 SPECIFICATION - K OHMS

Ranges	Resolution	Test Current (Max)
.100000 kilohm	1 milliohm	10 milliamperes
1.00000 kilohm	10 milliohms	10 milliamperes
10.0000 kilohms	100 milliohms	100 microamperes
100.000 kilohms	1 ohm	100 microamperes
1000.00 kilohms	10 ohms	1 microampere
10000.0 kilohms	100 ohms	1 microampere

Over-range: 20%

Range Selection: Automatic and Manual

Accuracy: 20°C to 30°C:

.1KΩ to 100KΩ

±(0.01% of input + 0.002% of range) - 90 days
±(0.01% of input + 0.004% of range) - 6 months
±(0.015% of input + 0.005% of range) - 1 year

1000KΩ

±(0.02% of input + 0.002% of range) - 90 days
±(0.02% of input + 0.004% of range) - 6 months
±(0.05% of input + 0.005% of range) - 1 year

10,000KΩ

±(0.05% of input + 0.002% of range) - 90 days
±(0.05% of input + 0.004% of range) - 6 months
±(0.06% of input + 0.005% of range) - 1 year

Temperature Coefficient, 0°C to 20°C and 30°C to 50°C:

.1KΩ to 1000KΩ

±(0.0007% of input + 0.0003% of range)/°C

1000KΩ

±(0.003% of input + 0.0003% of range)/°C

Response Time to within 0.01% of Step Function Change:

.1KΩ to 100KΩ

500 milliseconds

1000KΩ

1.0 second

10,000KΩ

3.0 seconds

Configuration: 4-wire on all ranges

Maximum Input Voltage: 30V RMS opens protective fuse

2-3. POWER SOURCE

The instrument is usually supplied for operation from 105-125-volt, 60-400 Hz, single phase power sources. However, the instrument will operate from 210-250-volt sources if the two primaries of the power tranformer are wired in series instead of parallel.

2-4. POWER GROUNDING

The third pin of the power plug grounds the outer chassis of the instrument (Figure 2-1). Despite the presence of the third grounding pin, there is no real assurance that the instrument will be correctly connected since the power outlets in many installations are erroneously wired. Be certain that the power source is in agreement with the power and grounding requirements of the instrument.

2-5. CONTROLS, INDICATORS AND INPUT JACKS

Refer to Table I for a description of operating controls, indicators and input jacks.

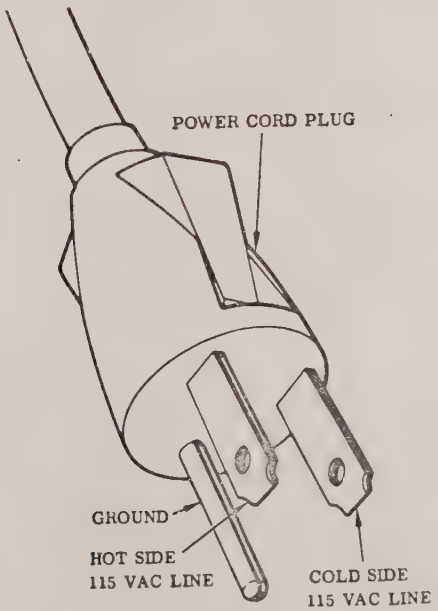


Figure 2-1. Power Plug Pin Coding

Table I. Operating Controls, Indicators and Input Jacks

DESCRIPTION	FUNCTION
PWR ON pushbutton switch	Applies VAC line power to the instrument.
AUTO RNG pushbutton switch	Selects automatic ranging mode of operation.
RNG CHNG pushbutton switch	Changes range of instrument if AUTO RNG switch is in the "out" position.
SIG HI input jack	Front and rear jacks connect to instrument signal input.
SIG LO input jack	Front and rear jacks connect to instrument signal common.
GUARD input jack	Front and rear jacks connect to inner guard shield.
Ω/+ REF input jack	Front and rear jacks are + current connections for ohms or "+" external reference voltage input.
Ω/- REF input jack	Front and rear jacks are - current connections for ohms or "-" external reference voltage input.
Overload indicator (Ω)	Incandescent bulb behind mask flashes Ω symbol when input voltage exceeds full scale capability of range selected if in manual range, or overall instrument capability if in AUTO RNG mode.
Polarity indicators	Incandescent bulbs behind mask indicate polarity of DC voltage applied to SIG HI terminal with respect to SIG LO terminal in VDC and ratio modes.
Readout tubes	Gas discharge display tubes which provide the readout in digital and decimal form. There are six plug-in tubes, each containing the numerals 0 thru 9 and a decimal point.
VAC pushbutton switch	Places the instrument in the AC voltage measurement mode if an AC/DC converter accessory is installed.

Table I. Operating Controls, Indicators and Input Jacks (Con't)

DESCRIPTION	FUNCTION
VDC pushbutton switch	Places the instrument in the DC voltage measurement mode.
KΩ pushbutton switch	Places the instrument in the ohms measurement mode.
R X 10 pushbutton switch	Places the instrument in the ratio measurement mode. The reading displayed is the ratio X 10 of the input voltage to the reference voltage. When making a ratio measurement it is necessary that a VAC or VDC switch also be depressed as desired.

2-6. OPERATION

2-7. STARTING PROCEDURE

a. Plug the power cord connector into the selected AC outlet.

b. Depress PWR ON pushbutton switch. Allow 30 minutes for instrument warm-up.

2-8. ZEROING THE READOUT

a. Connect signal input voltage leads to instrument as shown in figure 2-2.

b. Connect the terminals of the input leads together.

c. Be sure that the VDC and AUTO RNG pushbutton switches are in the "in" position and the R X 10 switch is "out."

d. The instrument readout should display .000000 + or - 1 digit. If it does not, adjust the VDC zero adjust potentiometer (R1) by inserting a small screwdriver in the opening directly underneath the VDC pushbutton switch and turning the adjustment screw until the readout displays ±.000000. Due to noise the readout will occasionally be ±.000001. The MX-1 is now ready to make measurements accurately, conveniently and quickly.

2-9. MEASUREMENT OF DC VOLTAGE

a. Ensure a zero readout (paragraph 2-8).

b. Connect terminals of GUARD and SIG LO input leads together.

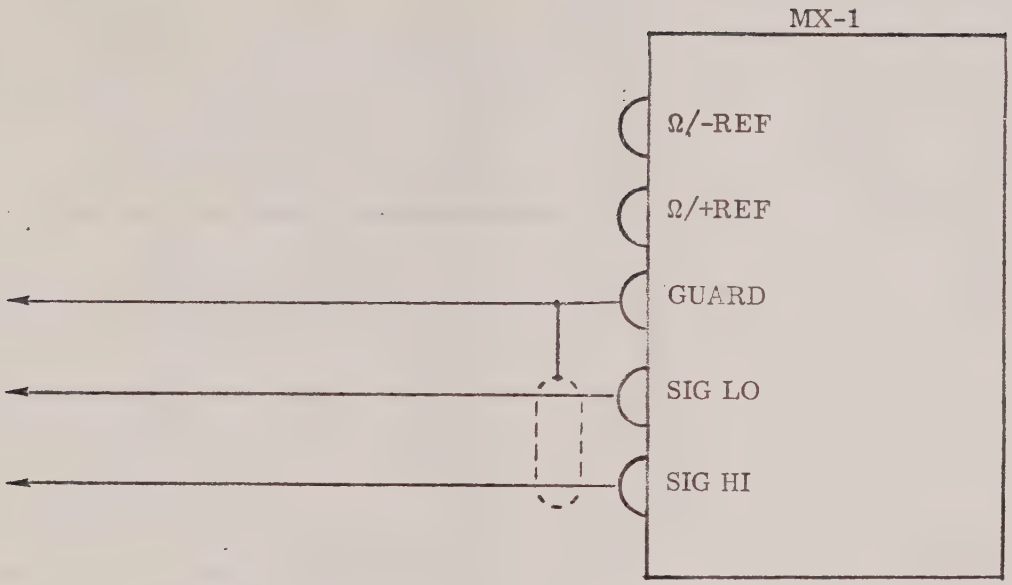


Figure 2-2. Voltage Input Cable Connections

WARNING

If high voltages are to be measured, use extreme caution. Serious injury or death may result from contact with terminals connected to high voltage sources.

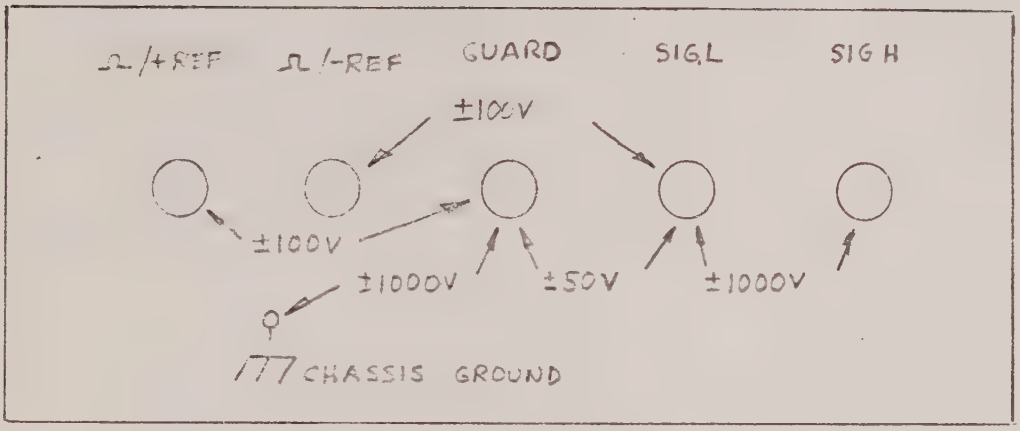
CAUTION

See figure 2-3 for maximum voltages which may be applied to the input jacks of the instrument without causing damage.

c. Connect terminal of SIG LO input lead to DC common of voltage source and terminal of SIG HI lead to voltage source.

d. The voltmeter will select the proper range automatically, displaying the voltage, decimal point and polarity of the input to the SIG HI jack with respect to the input of the SIG LO jack.

e. To select a voltage range manually, depress AUTO RNG push-button switch, bringing it to the "out" position. Note position of decimal point. Depress RNG CHNG pushbutton switch as required to reach desired range.



- Refer to the "CAUTION" following the Title Page of this manual.

Figure 2-3. Maximum voltages which may be applied to inputs of Series MX-1 without causing damage

2-10. MEASUREMENT OF +DC/+DC VOLTAGE RATIO

a. Ensure a DC zero readout (paragraph 2-8).

b. Depress the R X 10 pushbutton.

c. Connect reference voltage and ohms input leads to instrument as shown in figure 2-4.

d. Connect the terminals of GUARD and SIG LO of the signal input leads together.

WARNING

If high voltages are to be measured, use extreme caution. Serious injury or death may result from contact with terminals connected to high voltage sources.

CAUTION

See figure 2-3 for maximum voltages which may be applied to the input jacks of the instrument without causing damage.

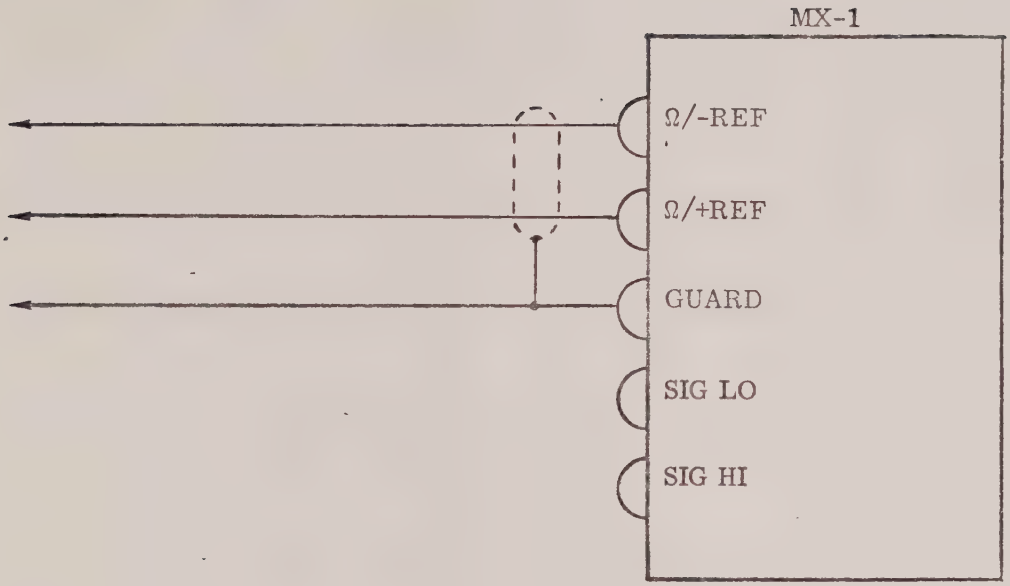


Figure 2-4. Reference Voltage Cable Connections

e. Connect the terminal of SIG LO input lead to DC common of voltage source and the terminal of SIG HI input lead to voltage source.

NOTE

The MX-1 makes a four-terminal measurement in the ratio mode. Therefore, both reference leads must be connected to the reference source and both input leads to the signal source. If the two voltages are isolated from each other, then the two commons must be connected together. See figure 2-5 for typical ratio application connections.

f. Connect the terminal of Ω/- REF of input lead to DC common of reference voltage source and Ω/+ REF input lead to reference voltage source.

f. The readout of the instrument will display 10 X (the ratio X 10 of the input voltage to the external reference voltage).

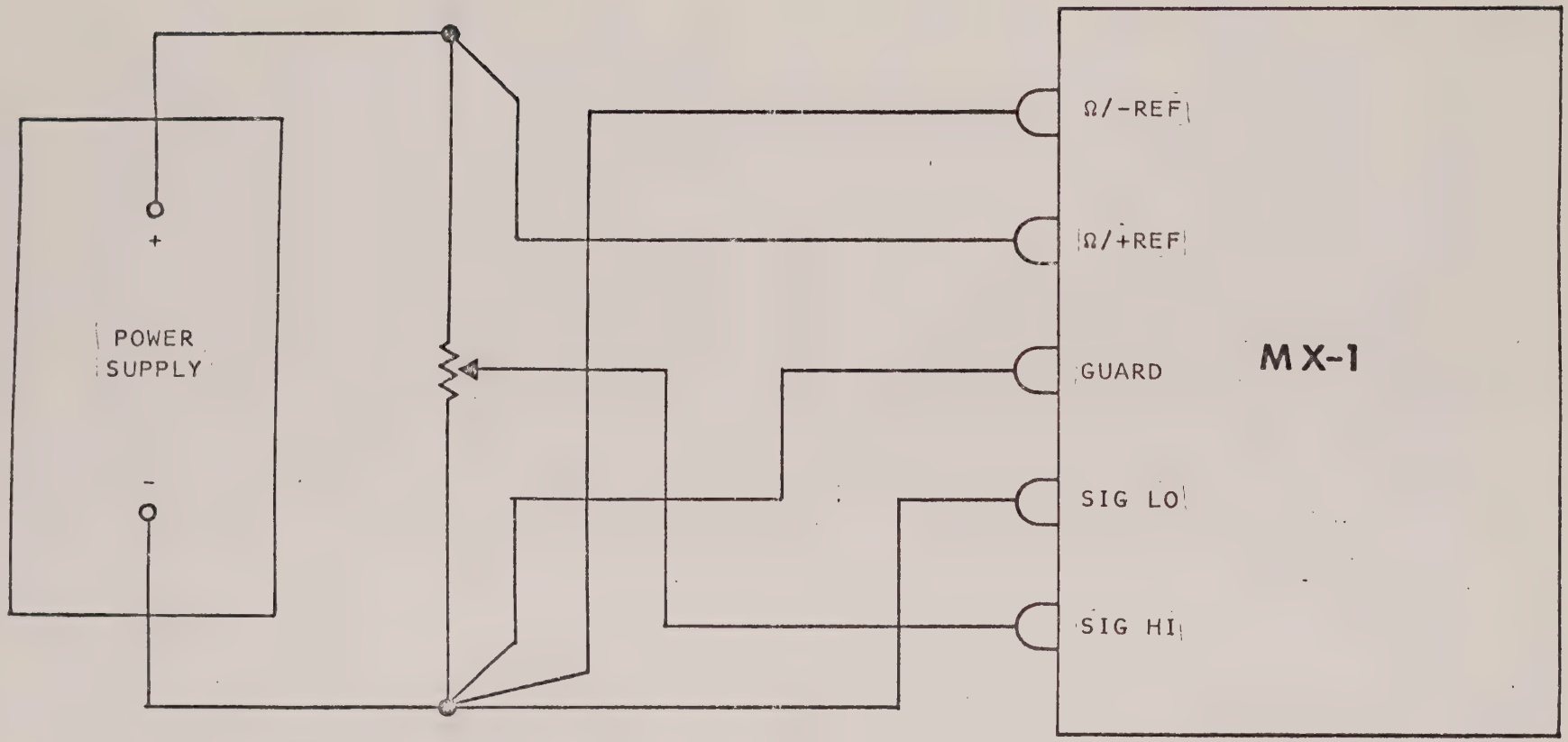


Figure 2-5. Typical Ratio Application

2-11. MEASUREMENT OF AC VOLTAGE

a. Ensure a dc zero readout (paragraph 2-8).

b. Press the VAC pushbutton.

c. With the clips of the signal input voltage leads remaining together, follow the zeroing procedure (paragraph 2-8e) except adjust the VAC zero adjust potentiometer (R7) directly underneath the VAC pushbutton to achieve 0.00000 or 0.00001.

d. Connect the terminals of SIG LO and GUARD of signal input voltage leads together.

WARNING

If high voltages are to be measured, use extreme caution. Serious injury or death may result from contact with terminals connected to high voltage sources.

CAUTION

See figure 2-3 for maximum voltages which may be applied to the input jacks of the instrument without causing damage.

e. Connect the terminal of SIG LO input lead to AC common of voltage source and terminal of SIG HI input lead to voltage source.

f. The voltmeter will select the proper range automatically, displaying the voltage and decimal point of the input to the SIG HI jack with respect to the input of the SIG LO jack.

g. To select a voltage range manually, depress AUTO RNG pushbutton switch, bringing it to the "out" position. Note position of decimal point. Depress RNG CHNG pushbutton switch as required to reach desired range.

2-12. MEASUREMENT OF AC/DC VOLTAGE RATIO

a. Ensure a DC and AC zero readout (paragraphs 2-8 and 2-11).

b. Press the VAC pushbutton.

c. Connect reference voltage input leads to instrument as shown in figure 2-4.

d. Connect the terminals of SIG LO and GUARD of signal input voltage leads together.

WARNING

If high voltages are to be measured, use extreme caution. Serious injury or death may result from contact with terminals connected to high voltage sources.

CAUTION

See figure 2-3 for maximum voltages which may be applied to the input jacks of the instrument without causing damage.

e. Connect the terminal of SIG LO input lead to AC common of voltage source and the terminal of SIG HI input lead to AC voltage source (figure 2-6).

NOTE

The MX-1 makes a four-terminal measurement in the ratio mode. Therefore, both reference leads must be connected to the reference source and both input leads to the signal source. If the two voltages are isolated from each other, then the two commons must be connected together. See figure 2-5 for typical ratio application connections.

f. Connect the terminal of Ω/-REF to DC common of reference voltage source and the terminal of Ω/+REF lead to DC reference voltage source (Figure 2-6).

g. The readout of the instrument will display the ratio X 10 of the AC input voltage to the DC reference voltage.

2-13. MEASUREMENT OF RESISTANCE

a. Ensure a DC zero readout (paragraph 2-8).

b. Press KΩ and AUTO RNG pushbuttons.

c. Connect input leads to instrument as shown in figure 3-4.

NOTE

The MX-1 makes a 4-terminal measurement in all ranges in the KΩ mode. Therefore, input and reference leads must be connected as shown in Figure 3-4 to obtain accurate measurements.

d. The instrument will select the proper range automatically, displaying the resistance value in KΩ.

e. To select a range manually, depress AUTO RNG pushbutton switch, bringing it to the "out" position. Note position of decimal point. Depress RNG CHNG pushbutton switch as required to reach desired range.

2-14. STOPPING PROCEDURE

To stop the digital voltmeter, depress PWR ON pushbutton switch, bringing it to the "out" position. Disconnect test leads and remove power cord from AC power source.

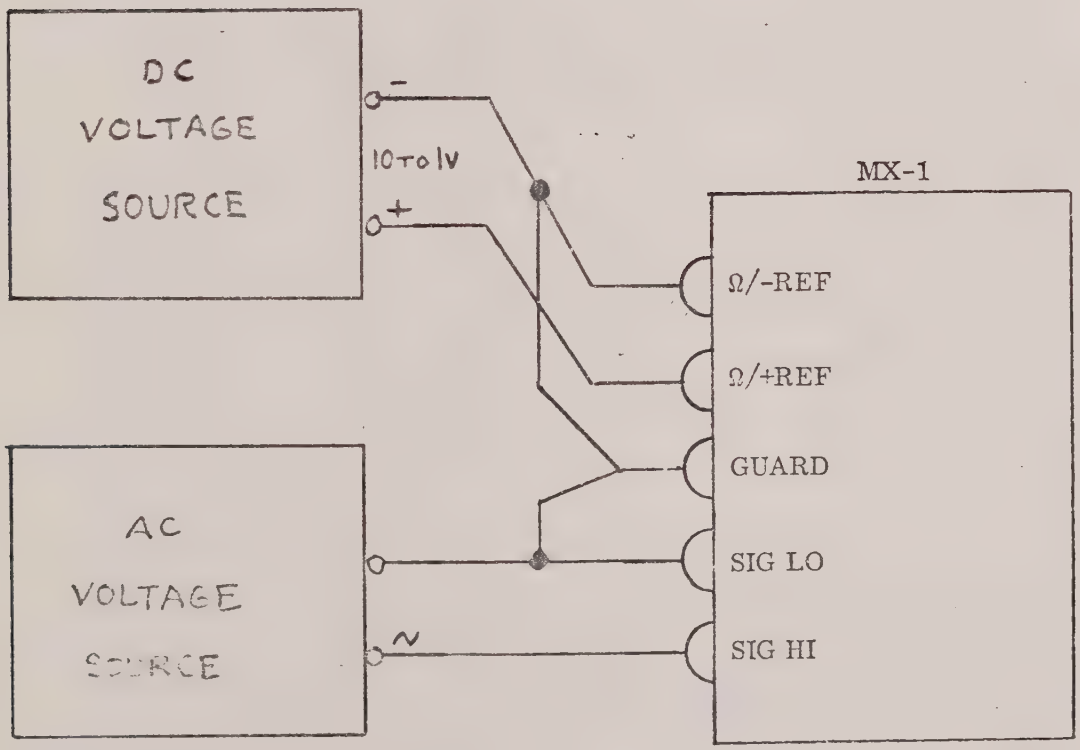


Figure 2-6. AC/DC Voltage Ratio Connections

CHAPTER III

CALIBRATION

3-1. GENERAL

A calibration cycle of 6 months is sufficient for areas of normal operating conditions. The calibration of any instrument changes slightly with age, use, and operating conditions. Also, problemts which may not be apparent during normal use will show up during a calibration check.

NOTE

The DC/DC ratio and VDC calibration procedures must be successfully carried out before the AC/DC or the KΩ calibrations are attempted.

3-2. TEST EQUIPMENT REQUIRED

a. DC voltage standard, John Fluke Model 332A, or equivalent.

b. Audio voltage standard, Holt Model 631B, or equivalent.

c. Ohms standard, E.S.I. Model DB52, or equivalent.

3-3. CALIBRATION PROCEDURE

3-4. INITIAL PREPARATION

a. Remove power cord from power outlet.

b. Turn fuse holder cap counter clockwise and remove it from the body of the fuse holder.

c. Remove top and bottom covers by removing two screws in each at rear of instrument and moving covers away and back toward rear of instrument.

d. Replace fuse and insert power cord into AC outlet.

e. Depress PWR ON pushbutton switch. Allow 30 minutes for instrument warm-up.

f. Be sure that the VDC and AUTO RNG pushbutton switches are in the "in" position.

g. It will be noted that the top shield displays the sequence numbers of calibration of each adjustment potentiometer for DC volts and ratio calibration.

3-5. ZEROING THE READOUT

Zero the readout in accordance with instructions contained in paragraph 2-8.

3-6. RATIO ADJUSTMENT

a. Connect the instrument as shown in figure 3-1.

b. Press R X 10 pushbutton switch.

CAUTION

With the instrument connected as shown in figure 3-1, never apply more than 100 VDC from the voltage standard or damage may result.

c. Set voltage standard to +10.00000 volts.

d. The numerical value displayed in the readout should be equal to +10.0000. If not, adjust .10V RATIO (2) potentiometer until the readout displays the correct value.

e. Disconnect the reference leads from the voltage source and release the R X 10 button.

3-7. VDC RANGE ADJUSTMENTS

a. Connect the instrument as shown in figure 3-2.

b. Press the VDC pushbutton switch.

c. Set the voltage standard to +10.00000 volts.

d. The numerical value displayed in the readout should be equal to +10.0000. If it is not, adjust the 10 VDC (3) potentiometer until the readout displays the correct value.

e. Set the voltage standard to +1.00000 VDC.

f. The numerical value displayed in the readout should be equal to +1.00000. If it is not, adjust the 1 VDC (4) potentiometer until the readout displays the correct value.

g. Set the voltage standard to +0.100000 VDC.

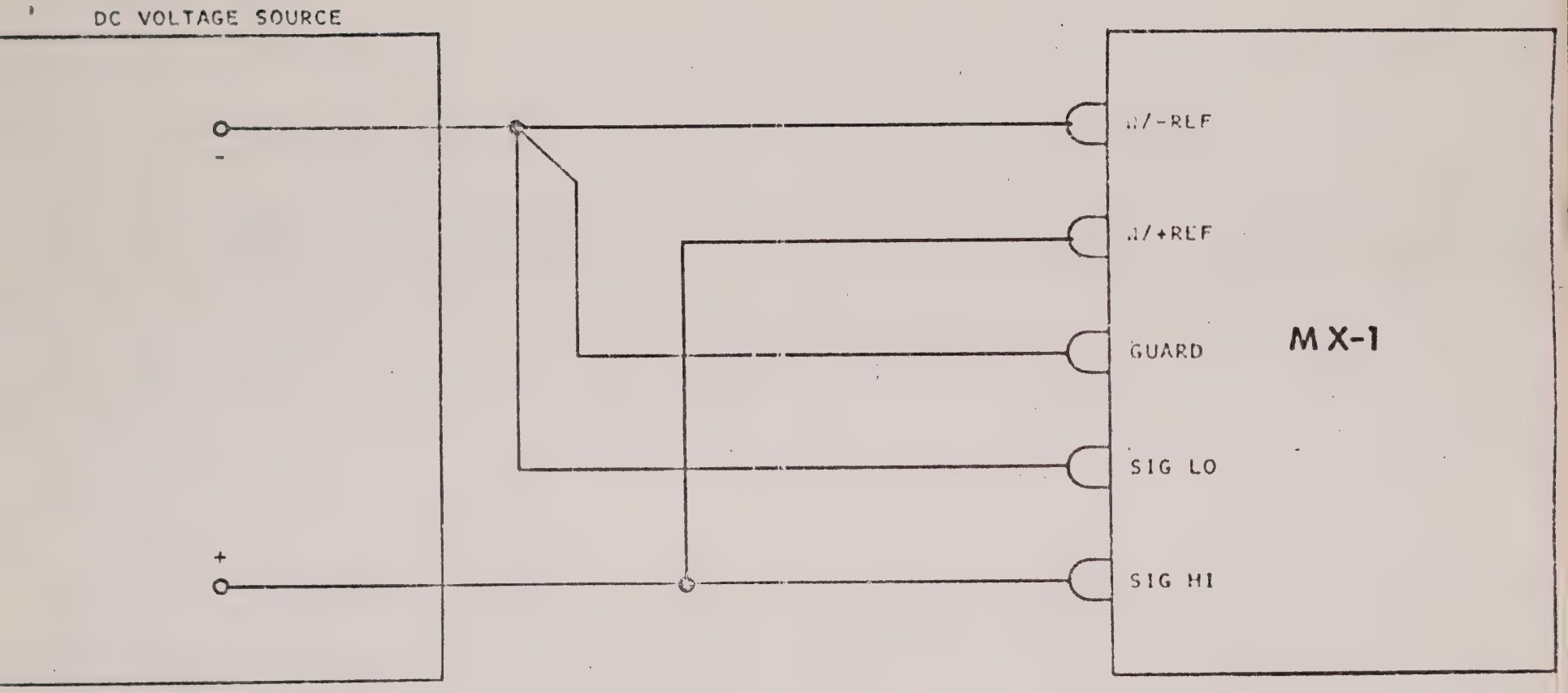


Figure 3-1. Ratio Adjustment Connections

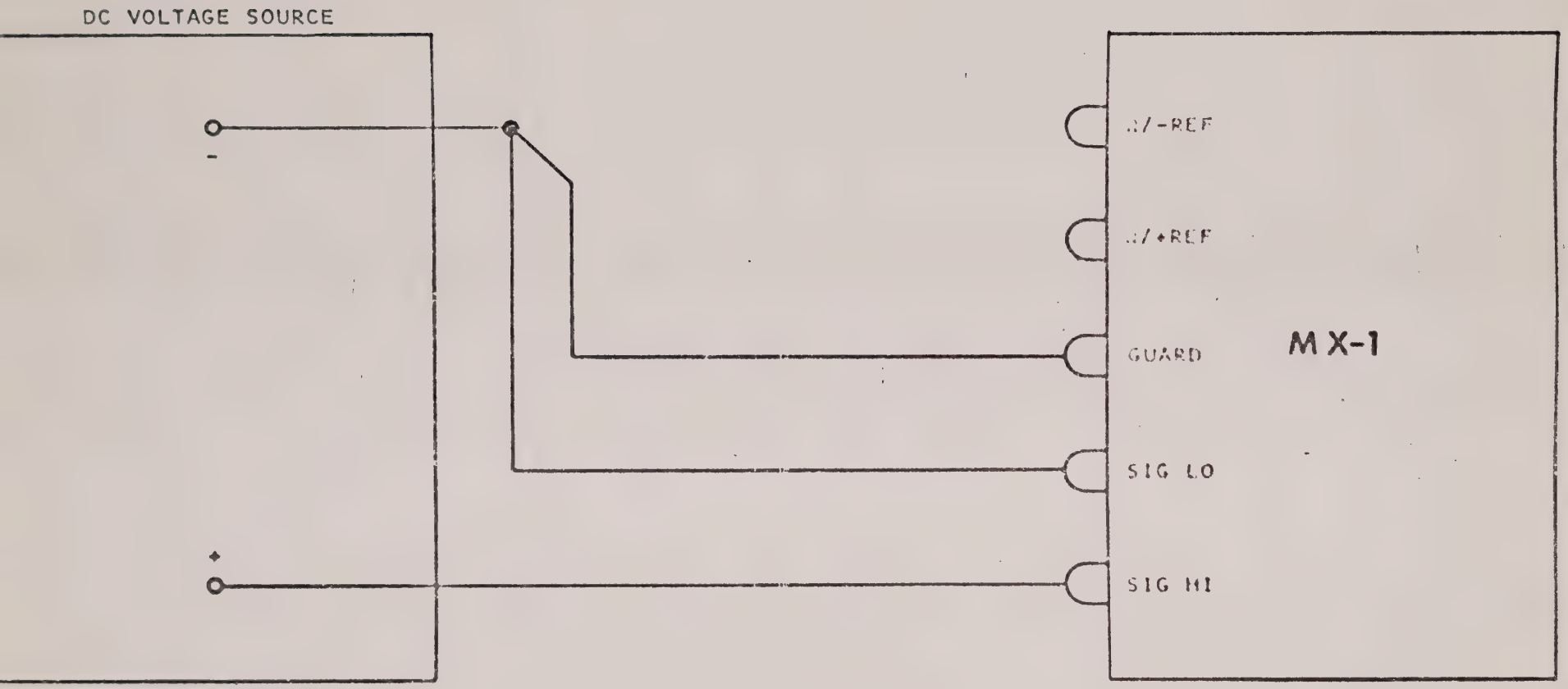


Figure 3-2. DC Voltage Adjustment Connections

h. The numerical value displayed in the readout should be equal to +.100000. If it is not, adjust the 0.1 VDC (5) potentiometer until the readout displays the correct value.

WARNING

Use extreme caution in performing the following steps as dangerously high voltages may be employed.

i. Set the voltage standard to +100.000 volts.

j. The numerical value displayed in the readout should be equal to +100.000. If it is not, adjust the 100 VDC (6) potentiometer until the readout displays the correct value.

3-8. AC/DC CONVERTER ADJUSTMENT

a. Ensure a DC zero readout (paragraph 2-8).

b. Depress the VAC pushbutton switch.

c. With the clips of the input cable remaining together, follow the zeroing procedure (paragraph 2-8e) except adjust the VAC zero adjust potentiometer (7) directly underneath the VAC pushbutton.

d. Connect the instrument to the audio voltage standard as shown in figure 3-3.

e. Set the audio voltage standard to 1 VAC @ 60 Hz. The readout should display 1.00000. If it does not, adjust the 1 VAC-60Hz (8) calibration potentiometer (figure 3-4) until it does.

f. Set the audio voltage standard to 1 VAC @ 10,000 Hz. The readout should display 1.00000. If it does not, adjust the 1 VAC-10 KHz (9) calibration potentiometer (figure 3-4) until it does.

WARNING

Use extreme caution in performing the following steps as dangerously high voltages will be employed.

g. Set the audio voltage standard to 500 VAC @ 60 Hz. The readout should display 500.00. If it does not, adjust the 500 VAC-50 Hz (10) calibration potentiometer (figure 3-4) until it does.

h. Check the calibration at other voltages and frequencies. If some point lies outside the rated accuracy limits, it may be brought in by a slight miscalibration at the above three set points.

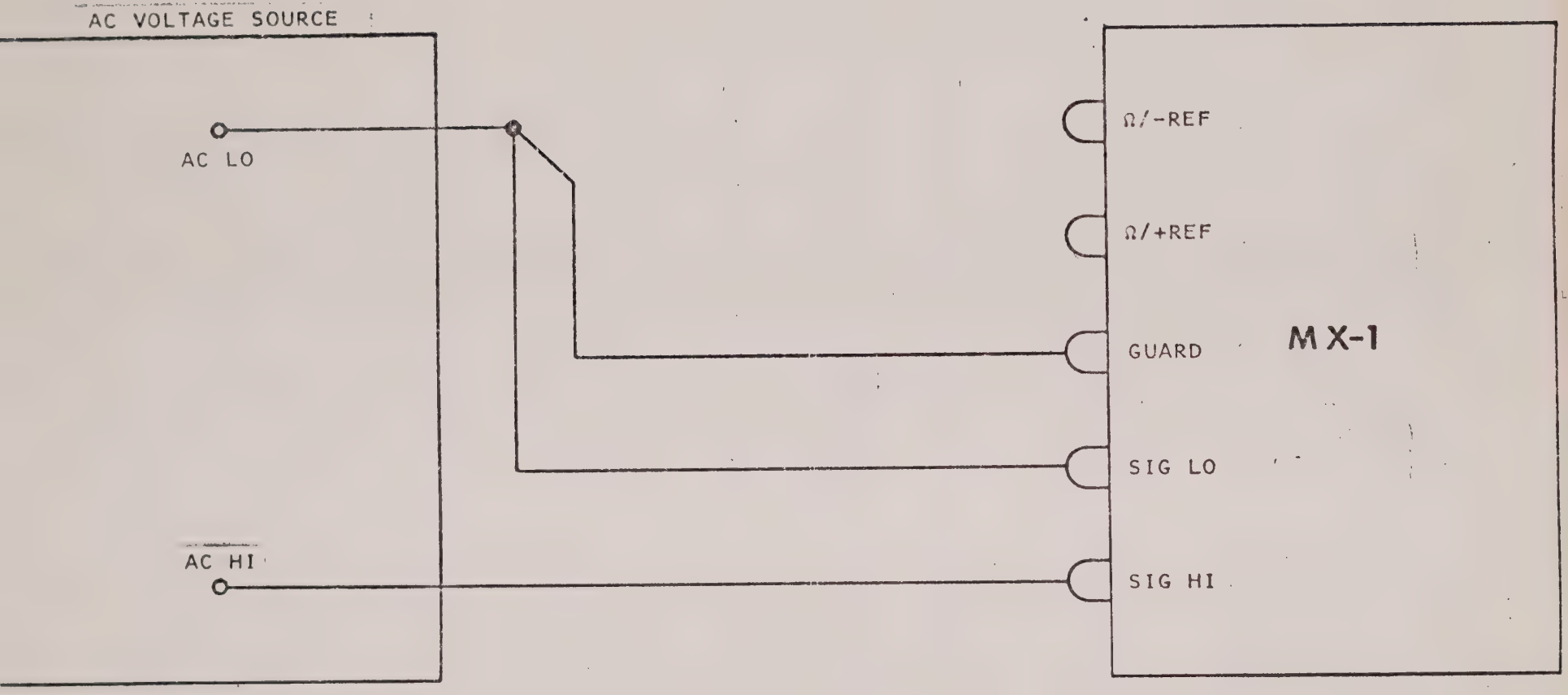


Figure 3-3. AC Voltage Adjustment Connections

3-9. KΩ/DC CONVERTER ADJUSTMENT

a. Connect the instrument as shown in figure 3-5.

b. Ensure a DC zero readout (paragraph 2-8)

c. Depress the KΩ pushbutton switch.

d. Connect the instrument to a decade resistant standard (E.S.I. Model DB52).

e. Set the standard to 100.000KΩ.

f. The numerical value displayed in the readout should be equal to 100.000. If it is not, adjust the 100KΩ (11) potentiometer until the readout displays the correct value.

g. Set the standard to 1.00000KΩ.

h. The numerical value displayed in the readout should be 1.00000. If it is not, adjust the 1KΩ (12) potentiometer until the readout displays the correct value.

i. Check the calibration at other resistance settings. If some point lies out of the rated accuracy limits, it may be brought in by a miscalibration at the above two set points.

j. Disconnect test leads and power cord, and reassemble instrument.

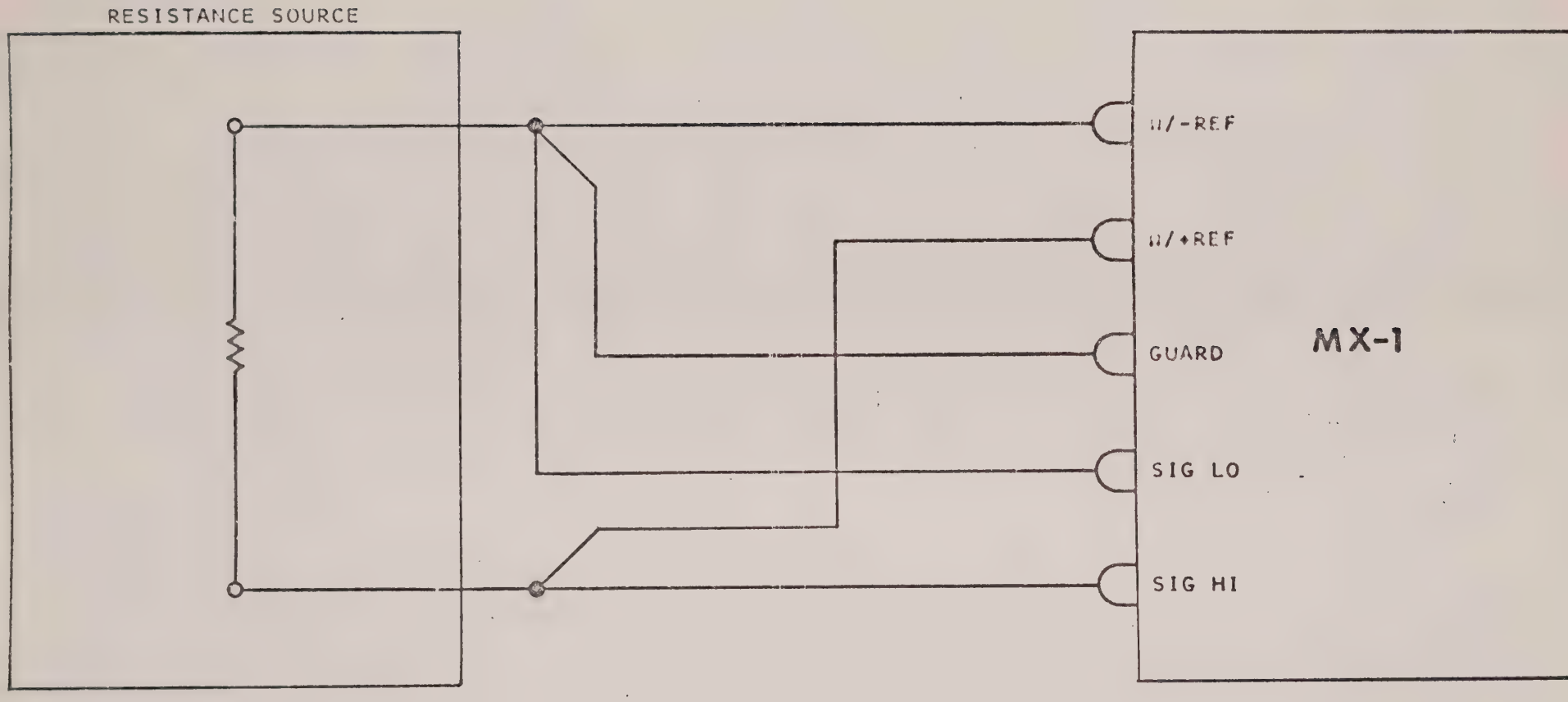
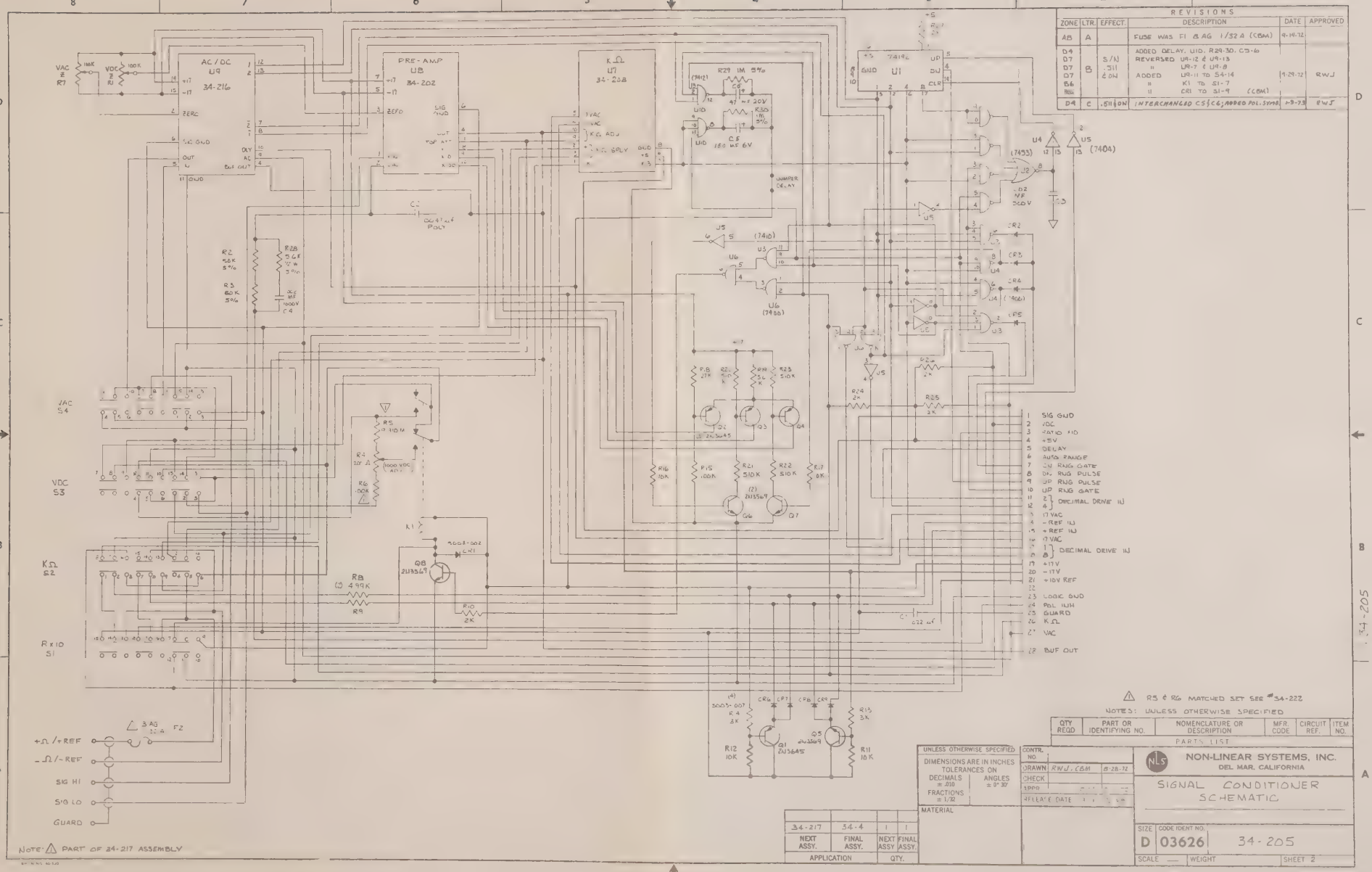


Figure 3-4. Ohms Adjustment Connections



REVISIONS					
ZONE	LTR.	EFFECT.	DESCRIPTION	DATE	APPROVED
A15	A		FUSE WAS FI 8 AG 1/32 A (CBM)	4-14-72	
D4	B	S/N .311 & DN	ADDED DELAY, U10, R29-30, C5-6	4-29-72	RWJ
D7			REVERSED U9-12 & U9-13		
D7			" U9-7 & U9-8		
D7			ADDED U9-11 TO S4-14		
E6			" K1 TO S1-7		
B6			" CR1 TO S1-9 (CBM)		
D4	C	.311 & ON	INTERCHANGED C5 & C6; ADDED POL. SYMB.	8-3-73	RWJ

⚠ R5 & R6 MATCHED SET SEE #34-222

NOTES: UNLESS OTHERWISE SPECIFIED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MFR. CODE	CIRCUIT REF.	ITEM NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ± .010 ANGLES ± 0° 30'
FRACTIONS ± 1/32
MATERIAL

CONTR. NO.
DRAWN RWJ, CBM 8-28-72
CHECK
APPD
RELEASE DATE

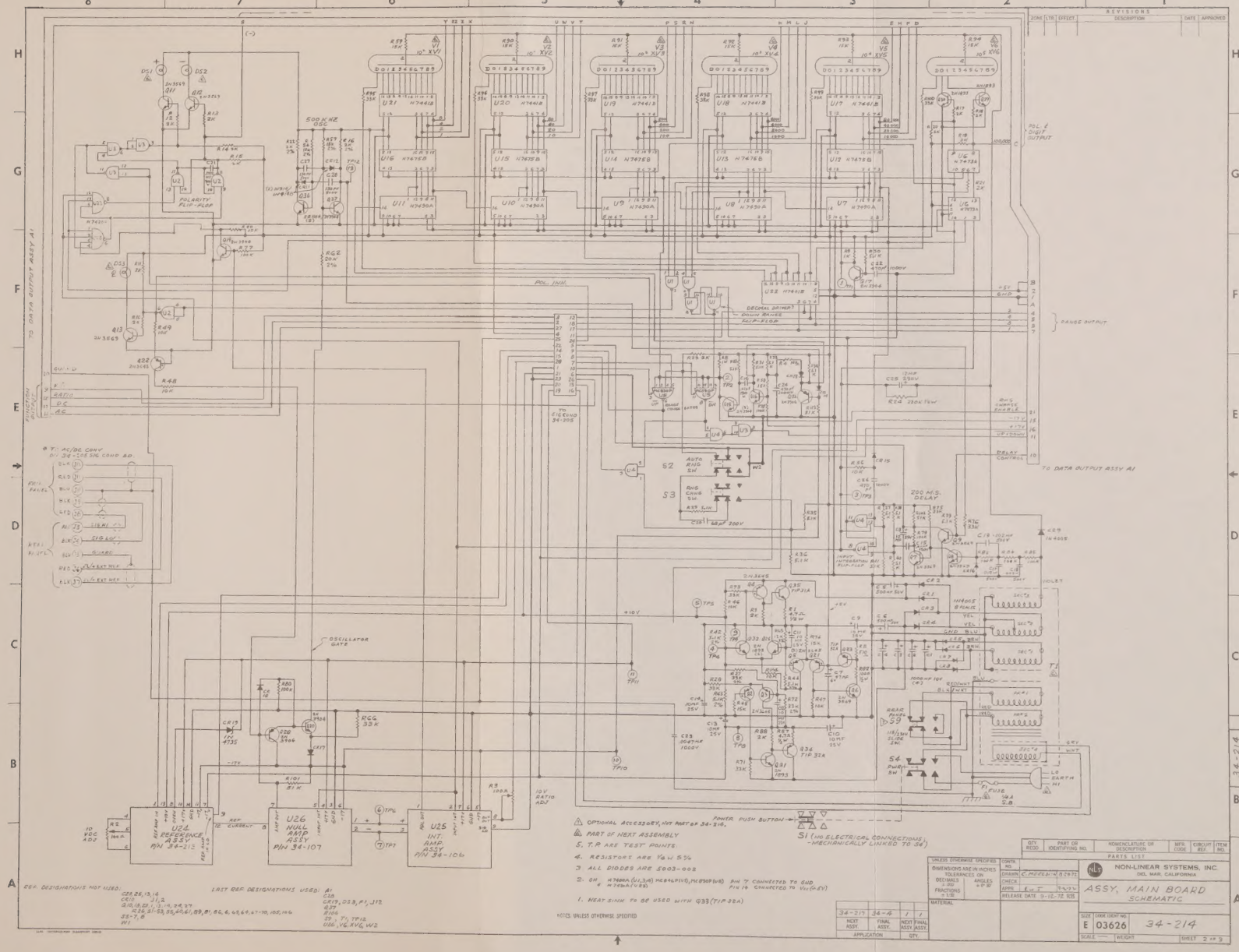
NON-LINEAR SYSTEMS, INC.
DEL MAR, CALIFORNIA

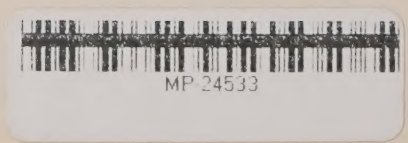
SIGNAL CONDITIONER SCHEMATIC

SIZE D | CODE IDENT NO. 03626 | 34-205
SCALE — | WEIGHT | SHEET 2

34-217	34-4	1	1
NEXT ASSY.	FINAL ASSY.	NEXT ASSY	FINAL ASSY.
APPLICATION		QTY.	

34-205


TO DATA OUTPUT ASSY A1
500 KHZ OSC
POLARITY FLIP-FLOP
DECIMAL DRIVER DOWN RANGE FLIP-FLOP
RANGE OUTPUT
POL. INH.
200 M.S. DELAY
AUTO RNG SW
RNG CHGE SW
REAR PANEL SW
POWER SW
OSCILLATOR GATE
U24 REFERENCE ASSY P/N 34-213
U26 NULL AMP ASSY P/N 34-107
U25 INT. AMP. ASSY P/N 34-106
10 VDC ADJ
10V RATIO ADJ
POWER PUSH BUTTON
S1 (NO ELECTRICAL CONNECTIONS) -MECHANICALLY LINKED TO S4)
OPTIONAL ACCESSORY, NOT PART OF 34-214.
PART OF NEXT ASSEMBLY
5. T, P ARE TEST POINTS.
4. RESISTORS ARE ¼W 5%
3. ALL DIODES ARE E003-002
2. ON H7660A (U1,3,8) MC849LP16, MC850P16B) PIN 7 CONNECTED TO GND PIN 14 CONNECTED TO VCC (+5V)
1. HEAT SINK TO BE USED WITH Q33 (TIP 32A)
NOTES: UNLESS OTHERWISE SPECIFIED
REF. DESIGNATIONS NOT USED:
LAST REF. DESIGNATIONS USED:
REVISIONS
ZONE | LTR | EFFECT | DESCRIPTION | DATE | APPROVED
PARTS LIST
NON-LINEAR SYSTEMS, INC.
DEL MAR, CALIFORNIA
ASSY, MAIN BOARD SCHEMATIC
E 03626 34-214
SIZE | CODE IDENT NO. | DRAWING NO.
SCALE — | WEIGHT | SHEET 2 OF 2
34-217 | 34-4 | NEXT ASSY | FINAL ASSY | NEXT ASSY | FINAL ASSY
APPLICATION | QTY.
DRAWN C. MCDEDIT 8/7/72
CHECK
APPR. E. of F. 8/12/72
RELEASE DATE 9-12-72 RLS
MATERIAL
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS ± .010 FRACTIONS ± 1/8 ANGLES ± 0°30'
CONTR. NO.


MP 24533